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Applying the Barrier Walkthrough Method: Going Beyond the Automatic Evaluation of Accessibility

Hélio Braga[a,] *, Letícia Seixas Pereira[a], Simone Bacellar Leal Ferreira[a],

Denis Silva da Silveira[b]

[a]*Universidade Federal do Estado do Rio de Janeiro (UNIRIO) - Av. Pasteur, 458, Térreo, Urca - Rio de Janeiro, RJ - Brasil*
[b]*Universidade Federal de Pernambuco, CCSA - Avenida dos Funcionários, s/n - Cidade Universitária, Recife - 50.740-580 / PE, Brasil*

Abstract

Over the years, people suffer changes caused by the aging of the body and might develop some kind of visual, hearing, motor, among others dysfunctions. These limitations may represent difficulties to access services provided by the Internet, which are growing increasingly. This work is an assessment of accessibility of Internet banking service of the Banco do Brasil using the Method Barrier Walkthrough. The application of this technique made it possible to identify, evaluate and suggest improvements to diminish the obstacles that hinder and/or make it impossible for the elderly users to perform tasks on this website.

Keywords: Evaluation of accessibility; web accessibility; elderly users;

* Corresponding author. Tel.: +55 21 87075005
E-mail address: helio.braga@uniriotec.br

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1. Introduction

The elderly are a growing portion of the population and have an active economic participation in Brazilian society [1]. Emerging countries are experiencing aging rate as high as in developed countries, overcoming them in some cases. In Brazil, the effects of aging are starting to be felt and will have an even greater impact in the next years [2].

Currently, it is found that the elderly are part of a growing market not only in terms of population as well as economy, representing a huge potential, and therefore deserving greater attention from researchers [2]. Given this scenario, applications that make the Internet accessible to this category of users become increasingly necessary.

Web accessibility is a feature that makes it possible for anyone, regardless of their status, at any time, location, device used and the environment, to have access to information and / or web services [3]. Usability is a feature that determines whether the handling of a product is easy, does not cause operational errors, provides a high degree of satisfaction to the user, it is easy to be learned and hardly forgotten [4]. An application-oriented usability does not necessarily mean that it is accessible and vice versa [5].

Even based on accessibility guidelines, such as WCAG (Web Content Accessibility Guidelines) and e-MAG (Accessibility Model of Electronic Brazilian Government), among others, the development of affordable systems is a challenge for designers, since different users have different needs and solutions may possibly be conflicting. This situation occurs in the case of elderly users, who often have a number of shortcomings to be considered, because of physical and cognitive changes due to age [6].

To determine if the interfaces, part of the system that interact with users to perform their tasks, are accessible is necessary to conduct an assessment of accessibility. One of the ways of evaluation is through the use of automated tools, which however are not able to identify usability problems with focus on specific kind of accessibility for users. Their own guidelines state that to consider an accessible interface, automatic checking is not enough, being also necessary human trials, with experts as well as users with limitations [7]. Furthermore, the automatic evaluation tools are not capable of evaluating dynamically generated content - it is only possible to evaluate those pages using samples [8].

But making observations with users is not easy; among the complexities of this process is the difficulty in obtaining volunteers available to perform the tests, representing an obstacle in making complete systems accessible [9].

Faced with these difficulties, and considering the increase of the elderly population in Brazil and the offer of essential services available to citizens through the Internet, this study aimed to assess the accessibility and barriers present in the access features of Internet Banking of Bank of Brazil using the method Barriers Walkthrough, which lists and describes a number of barriers that are sensitive to each category of users [10], making it possible to focus the assessment on elderly users. The aim of this study was to investigate whether this method can be used as a complement to automated evaluation, when you cannot make observations involving users.

2. Internet Banking

Internet Banking is a form of electronic commerce provided by banks, through which customers can perform various financial transactions such as payments, transfer money between accounts, discounts, loans, etc. [11], with this technology, banking services can be accessed from anywhere at any time, simply by accessing the internet [12].

The use of the Internet Banking brings several advantages to banks and their customers, such as reduced costs for maintenance agencies, particularly in personnel costs, streamlining services; eliminates the physical presence of the customer agencies; shorter queues, increased geographic reach through the Internet and can provide services on a large scale, decreased risk of burglary because there is less movement of people, money and services agencies.

The use of the Internet Banking is increasingly becoming popular, accounting for 23% of total banking transactions in 2010 and the second channel most used by customers [13]. The most used function is to balance query / extract with 79%. Secondly payments are being used by 60% and, finally, transfers and Doc's (Document Order Credit) - used by 44% 11].

Regarding the perception of users of Internet Banking in a survey by [11] 2005 10% of respondents revealed that most would use the service if someone taught him to. Furthermore, 46% revealed that misses attention online and 42% would like also a channel of direct contact with your manager by email.

3. Elderly

According to the Brazilian Statute of the Elderly (Law 10.741, of October 1, 2003) are considered elderly people aged over 65 years. On the other hand the World Health Organization (WHO) considers elderly people aged 60 or more, if they reside in developing countries, and 65 and most reside in developed countries [14].

Aging is a process that begins at birth, where there are several changes in the organs, cells and tissues, and are associated with psycho-emotional changes. At 65 years old, 50% of people may experience a disability at some degree and a quarter of the population may face some serious deficiency [6]. Aging without a chronic illness is an exception, however this should not present a reason for social exclusion, especially considering that seniors remain active in society [1]. According to [15], it is necessary to understand the limitations imposed by aging to reenter the elderly in social relations that are currently guided by new technologies. Some common disabilities in old age and the use of the Internet can be listed as: vision, motor skills and cognitive problems [6].

4. Assessment Methods Accessibility

An evaluation of interfaces is a systematic process of collecting data to analyze how users perform their tasks via some artifact computing environment. Through these assessments can identify usability problems and system accessibility [16][17]. Evaluation methods can be classified as inspection and observation of use. Assessment methods that do not require the presence users are called "inspection methods or analytical methods or predictions." Those are made with the presence of users are called "methods of observation and testing with users" [18].

An assessment can be done by automated tools that check whether the interfaces are in accordance with accessibility guidelines, generating reports with a list of problems that must be corrected so that the interface is considerably affordable. In general, the usability issues related to accessibility can be classified as: i) much focus in accordance with accessibility guidelines and not on usability ii) disregard the aspects of usability due to the dependence of systematic verification techniques of sites limited the layer of tags iii) evaluators disregard the fact that users move between pages using keystrokes and thus create their mental models [19].

4.1 Walkthrough Barrier Method

An inspection method interfaces that seeks to identify accessibility problems is the Barrier Walkthrough [20]. A barrier is a condition that makes it difficult for people to achieve their goals when surfing a site [10]. Possible barriers are raised previously and are based on interpretations and extensions accessibility principles well known and can be described in terms of the category of user involved, the type of assistive technology used, the goal is impacted, which are characteristics of pages found and the effects caused. For each user category, there is a list of potential barriers that can be checked on the web pages [20]. Lunn et al. [21] analyzed the existing guidelines in the literature on the effects of aging and produced a list of barriers faced by seniors.

To apply the method Barrier Walkthrough, the evaluator should identify scenarios composed of types of users, settings, goals and possible tasks [22]. It is also important to consider the possible barriers previously listed for a category of user in a context so that appropriate conclusions regarding the effectiveness, productivity, safety and

satisfaction of users can be made and define the degree of severity of the barrier that scenario [20].

It is recommended that the objectives and tasks that will be inspected by the method are extracted from the specification of use cases, so that each task / goal has a set of different interfaces or a path to be followed interfaces [22]. The evaluator follows the path established and given a category of user, identifies whether there are barriers that hinder the interfaces associated with the care of the goal or the tasks set.

According to the method, the barrier as soon encountered, should be given its severity, determined in accordance with the impact, that is, the degree of impairment of the purpose by the user in the given scenario, and persistence, which translates the number of times that the barrier arises while the user tries to achieve the initial goal. The severity of the barrier can be ranked among the values 1 and 3 (minor, major and critical), as shown in Table 1. The degree of impact varies 0-3, where zero means that the barrier was not identified, 1 the barrier did not interfere significantly in the task, two moderately affects the barrier task execution, forcing the user to transpose it and 3, the barrier prevents the advancement in the task requiring the user to search for alternatives to achieve your goal, or even prevents the user reaches his goal [10].

For each barrier identified, a degree of impact should be assigned. The degree of impact is interpreted by the evaluator considering how user performance in the task is affected. According to the method, user performance can be evaluated according to the following attributes [10]: Efficacy: the ability to accurately achieve the objectives; Productivity: time, effort, resources and cognitive load which are necessary to achieve some level of effectiveness; satisfaction: ease of use, productivity and safety perceived by the user, security: personal safety and financial. At the end of an inspection, the evaluators should gather and produce a list of problems involving a degree of severity for each of them, according to Table 1.

Table 1: Table severity of barriers [10].

Impact	Persistency	Severity
1	1	Minor
1	2	Minor
1	=>3	Relevant
2	1	Relevant
2	2	Relevant
2	=>3	Critical
3	1	Critical
3	2	Critical
3	=>3	Critical

5. Background

Two studies are found in the literature, but none has conducted an assessment of accessibility of Internet Banking systems, focusing on elderly users and a method combined with automatic evaluation and final tests with the user.

In Prado [23] work was undertaken to evaluate the quality of 12 Websites of Internet Banking by identifying the most important factors relevant to the determination of the quality concept in this context, and identifying user groups related by definition and perceptions of quality in relation to a Website. For the study we developed a model of variables measuring the perceived quality of websites by the user. Through the analysis conducted with a structured questionnaire as data collection, it was observed that the most outstanding qualities were usability and response time, linked to younger users, and ease of use, highlighted by older users.

In Sales and Cybis [24] we presented a checklist for compliance of Web pages according to specific recommendations on accessibility for elderly users. Through a subset of criteria developed through sensory and

functional capabilities of these users has created a checklist as an assessment tool. For web validation of the research, two evaluations of accessibility of interfaces were accomplished using the created artifact.

6. Research Method

This research, exploratory, was performed in four steps: a) select the method and the technical evaluation, b) execution of evaluation c) analysis of results and d) development of recommendations.

a) Select the method and the technical evaluation:

Barriers Walkthrough [20] method and a list of potential barriers for elderly users [21] were utilized, summarized in Table 2. This choice considered the difficulty of applying an automatic validation of the functionality of the Internet Banking site and the advantages in relation to the review of compliance with accessibility guidelines (guidelines), to provide a list of barriers to the category of elderly users keeping the focus on the type of user of interest in the study, and use usage scenarios, guiding the implementation of the assessment tasks and goals of interest to the user.

b) Execution of evaluation:

The following tasks were selected to be inspected: Main Interface, Access to bank account, Consult account balance, Consult bank statement, Make payment by bank transfer.

Two Information Systems students of a master's program Federal University in Rio de Janeiro made the evaluation and it did not use experts and/or users. The tasks chosen were performed by evaluators observing whether any existing barriers in the worksheet to collect assessment data from Figure 1 occurred. When a barrier was identified raters interpreted and stated their degree of impact on the task and the number of times they appeared. From this information, the degree of severity was derived, as shown in Table 1. For each barrier, the evaluators informed details of its interpretation and degrees awarded.

At the end of the evaluation, the evaluators gathered together to review the results collected. In this review the evaluators presented their interpretations in relation to identified barriers seeking consensus on the degree of severity assigned. Also in this meeting, the evaluators discussed about the improvements that could be made to eliminate or reduce the impacts of barriers according to the guidelines of the list of potential barriers for seniors [21].

To collect the data from the assessment a spreadsheet with the tasks to be inspected was elaborated and for each task, the list of barriers to the category of elderly users [21]. For each barrier the degree of impact, the persistence, the severity and details considered in the evaluation should be informed, according to Figure 1.

Página/Ação: Acessar a conta				
Tipo de Barreira	**Impacto**	**Peristência**	**Severidade**	**Detalhes**
Barreiras perceptíveis				
Contraste de Cores	1	2	Menor	
Cor é Necessário	2	3	Crítica	O menu principal de opções possui uma cor muito parecida com a cor de fundo da tela
Tamanho de fonte grande	3	2	Crítica	O texto indicativo de acesso a conta é muito pequeno
Texto Complexo	0	0	Não identificada	Barreira não identificada
Imagem sem texto equivalente	0	0	Não identificada	Imagens referenciadas corretamente
Conteúdo em Movimento	2	1	Severa	Uso de flash para banner (feed do facebook)
Barreiras Operacionais				
Hiperlinks e botões muito próximos	3	3	Crítica	
Hiperlinks e botões muito pequenos	3	3	Crítica	
Texto Descritivo do Hiperlink	2	3	Crítica	
Menus em cascata	3	2	Crítica	
Menus dinâmicos em Javascript	3	2	Crítica	
Eventos de Mouse	3	3	Crítica	
Fornecer dicas como orientações	2	2	Severa	Barreira não identificada
Minimizar os passos para chegar ao objetivo	2	1	Severa	Atalho facilitado no topo da página
Nova Janela	0	0	Não identificada	Barreira não identificada
Sobreposição de janelas	0	0	Não identificada	Barreira não identificada
Scrolling de página	1	1	Não identificada	
Imagens incluidas na ágina de fundo	0	0	Não identificada	Barreira não identificada
Barreiras de Compreenção				
Navegação Consistente e Layout.	1	2	Menor	As duas páginas são diferentes, porém com serviços diferentes, então considero a persistência como 1-Home e 2-Serviços
Grupo de conteúdos relacionados	1	1	Severa	Existem grupos de links e ações, mas não tenho certeza se é fácil identificar o ponto em comum
Evite confusão desnecessária	3	3	Crítica	O site contém muitas informações distribuidas de maneira arbitrária, confundindo o usuário
Tabela de dados complexos	0	0	Não identificada	Barreira não identificada
Página com cintilar ou piscar de conteúdo.	0	0	Não identificada	Barreira não identificada

Figure 1: Fragment Worksheet Used in Data Collection Evaluation.

Table 2: Pre-Existing Barriers to Senior Members [21].

Perceived Barriers Regarding Principle Noticeable, The WCAG 2.0 defines its concept and its use as: "User Interface Components with information and should be presented to users so that they can be perceived" [25]. This means that the entire contents of an interface must be available to the user, independent of any sensory disability or assistive technology that can be used to access it.	
Low contrast color Cause	Over the years, one can observe different degrees of contrast sensitivity, reducing its ability to distinguish between similar colors - with low contrast. Failure: Possible difficulty in reading the content on interfaces with low contrast.
Lack of consistency in the use of colors	Cause: The interface contains material, such as text, images, videos and background where color is used as the only means to distinguish between two or more different pieces of information. Failure: The user has no way to differentiate items with the required information.
Use small fonts Cause	In the elderly, there is a decrease in vision, affecting the ability of reading small text. In addition, smaller fonts, hinder access to a link, since often the precise movements of the mouse are hampered by the development of arthritis. Failure: Pages with small fonts can prevent the reading of texts and access to hyperlinks.
Complexity of texts	Cause: The interface contains texts difficult to understand the complexity and / or sentence structure, words, overset text acronyms and abbreviations, or by spelling errors. Failure: The user may have trouble understanding the content.
Picture no equivalent text	Cause: The interface contains images that provide information but only in graphical format, without textual description equivalent. Seniors may not understand the message contained in the images and can make use of alternative text to understand. Furthermore, these users can use assistive technologies such as screen readers to access the audio interfaces. If the images do not have this description, assistive technology will not be able to render the images into audio. Failure: Even if an elderly realize that there is an important image, you may not be able to understand the information it contains.
Use animated content	Cause: Use of images or text in motion - animated GIF, flash banners etc. Failure: The user may not be able to realize that the content has changed, he could not read fast enough to interact with the content or losing focus of the main information

Operational barriers Regarding Principle Operable, The WCAG 2.0 defines the interface components and navigation must be operable, so users should be able to operate all interface items, including widgets and hyperlinks, independent of any sensory disability or assistive technology used [25].	
Hyperlinks and buttons too close	Cause: The interface contains a sequence of links with little spacing between items in vertical or horizontal. Failure: Using the mouse the user can slide and trigger wrong elements.
Hyperlinks and buttons too small	Cause: The interface contains links and buttons too small. Failure: The user may experience difficulty using the mouse to click on hyperlinks or buttons too small.
Hyperlink without descriptive text	Cause: Hyperlinks that do not have adequate description may confuse the user in understanding the interface to which will be conducted. Failure: When having to click on a hyperlink to terminate a task the user tends to show signs of hesitation.
Use of cascading menus	Cause: The interface contains hierarchical cascading menus, where entries of a menu trigger a menu second level. Failure: The user may have difficulties to properly move the mouse pointer over the desired entries, submenus open and keep them open while trying to get the mouse pointer to the desired item.
Use of dynamic menus in Javascript	Cause: Seniors may have trouble moving the mouse, especially when demands precision. Failure: The interaction with dynamic menus can be harmed as a result of the possible difficulty of precise movements with the mouse. Thus, this functionality can be compromised.
Use of interactions based on mouse events	Cause: The interface contains actions that are invoked with functions from mouse events, generating specific behaviors. Failure: Seniors may have difficulty in controlling the mouse and use the keyboard only for certain activities. However, the processing of mouse event can create a situation where functionality seems to be available but does not work because it was not triggered correctly.
Lack of guidelines and tips for navigating	Cause: The elderly can acquire cognitive impairments that affect the light performance of their tasks, having trouble keeping your location and position within the interface. Failure: Users get lost and confused to complete the task.
Complexity and lack of navigation shortcuts	Cause: Many seniors suffer from the loss of short term memory. Exploring interface with contents arranged in complex hierarchies and deep can be a challenge for these users. Failure: The elderly can get lost and confused to complete the task
Opening new window	Cause: When pressing a button or link, the interface opens in new browser windows. Failure: When opening a new window, the context of interaction changes, altering the content and set of commands and controls. While the user performs a task, unexpectedly, a new window opens, frustrating the user. Often these windows are pop-ups with content irrelevant to the conclusion of the goal. In these windows, the back button of the browser does not redirect to the previous page.
Opening new window superimposed	Cause: When pressing certain button or link, the interface opens new windows overlapping the current window, covering it partial or completely. Failure: The user does not distinguish the new window opened earlier and therefore cannot identify the new context of interaction, including moving content, layout, hyperlinks, buttons and form controls.
Excessive scrolling interface	Cause: When the interface content or images are larger than the screen size, the user has to move the scroll bar up and down, or left to right. Failure: It can be difficult for a user to read an interface that constantly need to move content also hindering their understanding
Images included in the interface background	Cause: Often information is included as background in interfaces in image format and may cause confusion in the interface, confusing and distracting users. Failure: The user confusion can lead to failure to complete the task.
Understanding Barriers Regarding Principle Understandable, WCAG 2.0 defines the informaltion for operation in the user interface must be understandable [25]. Users should be able to understand all the information and contents present in the interface, independent of any sensory disability or assistive technology used.	
Inconsistent navigation and layout	Cause: For seniors with reduced cognitive abilities, the ability to perform tasks for the first time can be compromised. When browsing websites with inconsistent layouts, they experience difficulties as they cannot reference the current action to a previous experience. Failure: The interaction with the pages can become more stressful, besides the increase of the interaction time to accomplish a task, due to the constant need for learning between pages.
Lack of grouping related content	Cause: Users with reduced memory have difficulty remembering lists of related words. Failure: The information distributed through the site increases the demand of users' cognitive ability. This can slow the rate of task completion, since the user needs to spend more time to identify information and determine if that information is relevant to their task.
Excess information displayed	Causes: In elderly users there is difficulty in visual search, especially in complex screens. With excess information displayed on pages, users become more prone to distractions and errors. Failure: Unnecessary content in the same interface is distracting and can lead to a lower performance on the task.
Complexity in tabular data	Cause: Excessive numbers of columns and rows in tables contained. Failure: The user may experience difficulty in identifying the desired information, and to associate the contents of a row. In addition, there may be difficulty in understanding the information that requires the comparison of different rows and / or columns.

Page with flickering or flashing content	Cause: The interface contains elements such as images, texts or backgrounds, flashing or create flash effects at a rate between 3 Hz to 60 Hz. Failure: In users with photosensitive epilepsy, the page can trigger epileptic seizures [26].

7. Result Analysis:

The list of barriers used as reference was well defined, simplifying the process of identification of barriers during the execution of tasks. The chosen method meant that the evaluation was performed with a focus on elderly users, avoiding the evaluation of other elements that were not in the interest of research.

Regarding the impact criteria and persistence were found different interpretations, resulting in different levels of severity. Given this degree of subjectivity, it was evident the relevance of using the technique suggested by the joint evaluation method. But the identification of critical barriers was consistent among raters. Comparing assessments, barriers operating group showed the largest number of discrepancies in relation to degrees of severity, but showed the most agreement on the criticality. The evaluations indicated several barriers for seniors in the execution of tasks on site of Internet Banking of Bank of Brazil. Of the 115 hurdles at 5 interactions evaluated, 36.5% were classified as critical, and 16.5% considered significant 6% less severe. Of the total, 41% of the barriers were not identified.

Were found in the main interface 14 barriers, 10 being critical, 3 significant, 1 lower, and the other 9 were not identified. The size of the sources used and the lack of alternative text on images barriers were rated critical. In operating group, where six were found as critical barriers, hyperlinks presented problems related to the distance between them and had no callouts. The use of dynamic menus in Javascript and interactions based on mouse events were also classified as critical barriers. For large barriers of understanding, excess of information set out in the page layout and inconsistent navigation were identified.

In the evaluation of the task access the account identified 15 barriers, being 9 reviews, 4 significant, 2 lower and 8 unidentified. In performing this task, the use the small font was touted as a critical barrier. The colors used in the texts were very similar to the background color of the page, making the reading difficult. The group identified that operational barriers on the main interface were again found and on the barriers of understanding, the excess of information was also observed.

Regarding the assessment of the task query balance, 7 critical barriers, 3 significant, 1 minor were found and 12 were not identified. The operational barriers found in the main interface also repeated this task, with very small text, information and options in excess.

In the evaluation of the task query bank statement, the 23 barriers analyzed, 9 were not identified. Group perceived barriers were found 2 of lower severity and 4 critical, including the size of the font used, low contrast and lack of consistency in the use of colors and the use of complex text to display options when generating the bank statement, purpose of the task. As in the previous tasks, the operational barriers identified were repeated, and the barriers of understanding, repeated information overload with critical severity

Perform the task pay per bank, the evaluation revealed 7 critical barriers and 7 severe. The low contrast of colors and small fonts were observed and considered critical. Barriers were identified as critical operational hyperlinks coming, small buttons, dynamic menus in Javascript and using interactions based on mouse events. Again, excess information has been exposed barrier understanding assessed as critical.

The main interface received the most critical barriers, which are repeated in almost all tasks. The excess of information exposed, one of the barriers of understanding, occurred in all tasks evaluated. Barriers to use small fonts, hyperlinks and buttons too close and too small, use of dynamic menus in Javascript and using mouse events were common, occurring in almost all tasks evaluated. This may be an indication of failure in the design of the project in its structure, causing the barriers to propagate in all interactions observed in the system. Most assessed as critical barriers are related to the operation of the interfaces, which directly affect the user's goals when accessing the system.

8. Recommendations:

The list of barriers that affect elderly users elaborated by [21] presents, along with the definitions of the barrier, recommendations to avoid them. Thus, the tuning recommendations come from the method, facilitating their implementation. Most people, over the years, eventually develop some kind of problem related to vision. Therefore it is recommended to use large fonts like 12pt, and it is also necessary that the pages that have features, such as a link to increase the size of the text, are plotted in order to allow the correct reading of the content, regardless of font size chosen by the user [21].

As elderly people generally have slower and inaccurate movement, possible barriers to these users are buttons and hyperlinks, often located close to one another and / or having a very small area to click on. This can cause some difficulty in accessing the pages, or errors in navigation and may be avoided by ensuring that these elements have a larger area for mouse click, or are separated by a blank space to help in distinguishing the elements and access even when the mouse is used with low accuracy. To improve the performance of navigation buttons, the measurement of these items should be around 180 x 22 pixels [21].

Regarding the use of dynamic menus, options and commands created by Javascript, they should be able to be selected even when the technology is not enabled, i.e. when the option to disable Javascript is checked, all resources should be available. Furthermore, to ensure access to resources triggered by mouse actions, similar effects through logical event handlers should be created, as onfocus and onkeypress [21]. These attributes are designed to be device-independent, being shot through the keyboard, mouse, or through other interfaces [7].

To use the menus, is encouraged to implement plans through menus ordered listing of hyperlinks. It discouraged the cascading menus implemented using Javascript and CSS (Cascading Style Sheets) [21].

It is also possible to observe the elderly some level of attention deficit. Therefore, the elements present in the interface, such as images, banners and hyperlinks should be reviewed so as not to confuse users, bringing the attention of the same only for the information relevant in the interface [21].

9. Research limitations

Although the technique used in this study is objective about the verification of the existence of barriers, to accessibility evaluation it would be more assertive to count with the participation of users. The lack of specification of use cases can also be considered a limitation, since the evaluators inferred through its knowledge, the journey to the execution of tasks.

10. Final Considerations

The method Barriers Walkthrough was considered appropriate for the evaluation of the accessibility of the system of Internet Banking Bank of Brazil, since it enabled the evaluation to occur focused on the difficulties faced by older users to utilize the functionality proposals without, however, requiring user participation. The application of the method in the main functions of the system from the point of view of elderly users revealed a number of critical barriers that can potentially affect the effectiveness, productivity and satisfaction of this category of users.

With the use of the method was possible to systematically identify usability problems related to accessibility and propose recommendations. With the difficulties in the use of automatic verification, the method allowed a rapid and objective assessment, reducing the complexity of conducting the evaluation.

Finally, it is concluded that the interfaces of the tasks evaluated on the Internet banking service of the Bank of Brazil, could be reformed in order to improve access for elderly users. As a continuation of this study, new reviews will be conducted using the same method, with a larger group of evaluators in order to study the effects of divergences and convergences of results. Moreover, one can observe the applicability of lists of barriers by category of users as references in achieving non-functional requirements related to the accessibility of web interface development.

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